

A-95-32
11-D-29



Asphalt Roofing Manufacturers Association

4041 powder mill road, suite 404
calverton, maryland 20705-3106

tel: 301.348.2002
fax: 301.348.2020

March 18, 2001

Via Overnight Delivery:

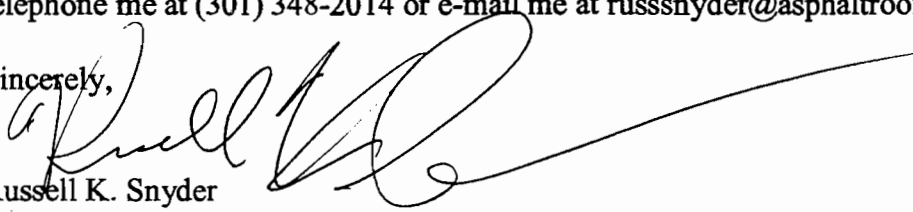
Richard S. Colyer
Project Engineer
U. S. Environmental Protection Agency
Emission Standards Division, OAQPS/EPA
MD-13
U.S. EPA Mail Room
Research Triangle, NC 27711

Dear Mr. Colyer:

Thank you for meeting with representatives of the Asphalt Roofing Manufacturing Association on February 27, 2001. We appreciated the opportunity to answer your questions on our February 2, 2001 submittal to the Agency and to understand both the timing of the rulemaking and the proposal process.

The attached document responds to the questions you provided prior to the and to additional issues raised during and after the meeting. Please note that Appendix A, Sketch A and B should be treated as Confidential Business Information (CBI). Should you find that this document is not completely responsive to your questions, please telephone me at (301) 348-2014 or e-mail me at russsnyder@asphaltroofing.org.

Sincerely,


Russell K. Snyder
Executive Vice President

Enclosures: ARMA Comments dated 3/18/01
Appendix A—Confidential Business Information
Sketch A—Confidential Business Information
Sketch B – Confidential Business Information

EPA Question #1

We'd like to see the HCl modeling done: The model used, the input data, and the results.

ARMA Response. The modeling was conducted by Trinity Consultants and was described in a report dated January 20, 1999. The modeling was conducted for CertainTeed's plant in Oxford, North Carolina. The report was submitted to EPA during the meeting on February 27, 2001. The text accompanying the report was edited to remove a small amount of information considered confidential business information.

Two scenarios were modeled using SCREEN3. In the first scenario, no downwash effects, cavity impacts or elevated terrain features were taken into consideration; the maximum hourly off-property concentration of hydrochloric acid (HCl) was modeled to be 0.018 mg/cubic meter. In the second scenario, downwash, cavity impacts and elevated terrain features were included. The highest hourly concentration predicted was 0.352 mg/cubic meter.

According to EPA's Integrated Risk Information System (IRIS) database, hydrochloric acid is an irritant for acute exposure. No data available support a conclusion that hydrochloric acid is a carcinogen; 6.1 mg/ m³ has been established as the lowest observed adverse effects level (LOAEL). The American Conference of Government Industrial Hygienists (ACGIH) has adopted 7.5 mg/m³ as its threshold limit value (TLV). The Occupational Safety and Health Administration (OSHA) has also selected 7.5 mg/m³ as a ceiling exposure limit.

EPA Question #2

What test data are available for developing the HCl emission factors?

ARMA Response. HCl data from three plants were used to calculate the HCl emission factors. Stack sampling reports were provided to EPA on February 27th and the results themselves are found in the ARMAHAPs.xls spreadsheet in the workbook called Cat-Ox-Still in cells A246 – A248.

Linnton plant -- 1994 -- 0.25 lb/ton

Medina plant -- 1995 -- 0.19 lb/ton

Minneapolis plant -- 1999 -- 0.26 lb/ton measured with FTIR and GRC

During the February 27th meeting, complete sampling results were provided for Linnton and Medina. For Minneapolis a shorter report, containing the information necessary to understand the data, was provided. Sampling conducted at Oxford in 1999 yielded a value of 0.19 lb of HCl /ton of asphalt. Because these data were obtained later, they were not included in ARMAHAPs.xls spreadsheet. As a practical matter, their inclusion would have made very little difference in the data. The average of the three original values is 0.23 lb/ton; the average of all four is 0.22 lb/ton. The Oxford data (0.19 lb of HCl/ton of asphalt) were used in the modeling conducted at Oxford, and described in the response to question #1, above.

EPA Question #3.

In our earlier meeting, we discussed control of HCl emissions; while such controls may or may not be cost effective, they should be addressed. We talked about the possible use of scrubbers or other control devices, binding the HCl in the asphalt, and adding chemicals to the KO tank. ARMA was going to provide additional information.

ARMA Response. There are no HCl controls operating on existing blowing stills. Three possible approaches to the control of HCl emissions are discussed below: packed bed scrubbers and two patented Owens Corning technologies. All of these technologies should be considered experimental for this application, as they have never been operated on a continuous basis for these types of sources.

Packed bed scrubbers.

During the meeting on March 27th, ARMA presented a cost-effectiveness calculation based on cost data from the EPA-CICA Fact Sheet, Packed-Bed/Packed-Tower Scrubber. This document is found on EPA's website at: <http://www.epa.gov/ttn/catc/dir1/fpack.pdf>.

Since that time, a more detailed cost estimate prepared by a consultant for an ARMA member company has become available. It is presented below.

Engineering Estimate for HCl Scrubber Cost**ENGINEERING & DESIGN COSTS**

Design and Engineer Equipment	\$35,000
Design and Engineer Bldg, Utilities Installation	\$50,000
Construction & Field Expenses	\$50,000
Contractor Fees (unless turnkey with equip.cost)	\$0
Start-up & Performance Tests	\$10,000
Contingencies	\$110,000
SUBTOTAL (less contingency)	\$145,000

CAPITAL EQUIPMENT COSTS

Site Preparation	\$10,000
Foundations & Supports	\$50,000
Handling & Erection	\$140,000
Electrical	\$50,000
Piping	\$100,000
Insulation	\$25,000
Painting	\$5,000
Buildings	\$75,000

Engineering Estimate for HCl Scrubber Costs (Continued)**CAPITAL EQUIPMENT COSTS (Continued)**

Scrubber	\$325,000
Auxiliary Equipment (holding tanks, pumps, etc)	included
Sales Taxes	included
Freight	included
SUBTOTAL	\$780,000

ANNUAL COSTS

Caustic for water treatment	\$132,300	per year
UTILITIES		
Electric	\$18,825	per year
Make-up Water	\$15,000	per year
Wastewater Disposal	\$60,238	see note
LABOR	\$32,000	per year
Operating (2hrs/day x 350 days/year)	\$15,876	22.68/hr
Supervisory (0.5 hrs/day x 350 days/year)	\$4,243	24.25/hr
Maintenance (1 hr/day x 350 days/year)	\$11,396	32.56/hr
Maintenance Materials & Parts	\$10,000	per year
Depreciation & Capital Recovery	\$137,852	per year (8%, 10 yr life)
Property Taxes	\$7,800	per year
Insurance	\$5,658	per year
Overhead	\$25,687	per year
Administration	\$11,315	per year
TOTAL ANNUAL COSTS	\$456,675	

Note: Salt water disposal options range from finding uses to on-site desalination to trucking off-site for treatment (in rural locations that may not provide for sewer discharge to POTW) \$6/1000 gallons was used to estimate hauling and treatment costs for off-site desalinization & discharge.

Assuming that the scrubber must treat 13 tons per year of HCl and is 99% efficient, the unit would remove 12.87 tons of HCl per year. The cost-effectiveness is then $[(\$456,675/\text{year}) / (12.87 \text{ tons/year})]$ or \$35,484/ton of HAP removed.

References Used

- (1) Vatuuk, William, "Estimating Costs of Air Pollution Control" 1990, Lewis Publishers, Chelsea Michigan, pp 17 - 38.
- (2) March 2001 Croll-Reynolds proposal to Trinity Consultants.
- (3) EPA-CICA Fact Sheet, "Packed Bed/Packed Tower Scrubber" from OAQPS website, March 1, 2001.

March 18, 2001

ARMA Response to EPA Questions

- (4) OAQPS CONTROL COST MANUAL, 5th Edition 1996, EPA 453-B-96-04, February 1996, Chapter 9 on Gas Absorbers.*
- (5) March 2001 CertainTeed Corporation Engineering Dept, Accounting Dept, and Environmental Department internal communications.*

Patented Owens-Corning Technologies

Owens Corning has two patents for technologies intended to control hydrochloric acid emissions from blowing stills using ferric chloride. Although both technologies have been operated during short-term production-scale trials, there is no actual application of this technology. Because of the patents, the technologies are not currently available to any company other than Owens-Corning. During the meeting on February 27th, ARMA mistakenly identified the patent numbers as 24592A and 24593A. These were the patent application numbers, rather than the patents themselves. The patents are Patent 6,162,410 and Patent 6,036,843. The abstracts describing the patents are excerpted below. The full text is available at <http://www.uspto.gov/patft/index.html>.

Patent 6,162,410 Abstract: In a method for reducing hydrogen chloride emissions from an asphalt air-blowing process, an asphalt is subjected to an air-blowing process where air is bubbled through hot asphalt to raise the softening point of the asphalt. The fumes from the air-blowing process are bubbled through a liquid seal in a knockout tank before going to an incinerator and finally being emitted to the atmosphere. The knockout tank normally operates to condense oil in the fume stream, and the liquid seal is composed of this oil, as well as some of the water evolved in the air-blowing process. When using ferric chloride or ferrous chloride as a catalyst in the air-blowing process, the fume stream contains significant levels of hydrogen chloride. In this invention, a chemical modifier is added to the process oil and water seal in the knockout tank prior to the start of the process in order to reduce the amount of hydrogen chloride in the emitted fume stream by at least 25% by weight compared to the same process without the addition of the chemical modifier.

Patent 6,036,843 Abstract: In a method for reducing hydrogen chloride emissions from an asphalt blowing process, ferric chloride and/or ferrous chloride are added to the asphalt. A chemical modifier is also added to the asphalt. The asphalt is subjected to a blowing process, which produces hydrogen chloride emissions. The addition of the chemical modifier reduces the hydrogen chloride emissions by at least 25% compared to the same process without the addition of the chemical modifier. The addition of the ferric chloride and/or ferrous chloride provides beneficial effects such as increased blowing rate and increased final penetration of the asphalt. Preferably, the addition of the chemical modifier does not significantly reduce these beneficial effects.

Note that the removal efficiencies for each of these technologies are “at least 25%.” While these technologies have been trialed at Owens Corning plants, other operators of blowing stills have not had the opportunity to evaluate them. Additionally because these technologies have been patented by Owens Corning, it is not possible for ARMA members other than Owens Corning to calculate the cost of implementing these technologies. Accordingly, no \$/ton of HAP removed cost is presented here.

EPA Questions #4, #5 and #6.

Please provide the facility name and location for the roofing lines listed in appendix E. Without it, appendix E is not useful. If necessary, the information may be submitted as confidential

business information. Have the control devices listed in appendix E been updated since the 1995 survey? If not, could ARMA provide their most recent data for roofing line control devices mentioned in section 3.2? Has ARMA obtained any revised or additional data on the level of control for sources besides blowstills since the 1995 survey? Has ARMA obtained or developed any additional cost data since the 1995 survey?

ARMA Response to Questions 4, 5 and 6. ARMA conducted an effort to expand the information available regarding roofing lines and associated control devices. As described during the February 27th meeting, ARMA's consultant asked facilities to provide information concerning the status of lines during the 1995 baseline year. The question asked was "In 1995, were your roofing line(s) controlled by a thermal oxidizer operating at greater than 1200°F?" No distinction was made among the separate types of roofing lines (coaters, saturators and wet loopers). No information was gathered on control devices applied to ancillary equipment such as storage tanks, loading operations, applicators, and sealant and adhesive tanks. (See response to question #8, below.) Accordingly, with one exception (see next paragraph) ARMA has no significant information to add to ERG's *Table 1: Summary of Equipment Types and Control Devices* provided to ARMA during the February 27th meeting.

As discussed during the February 27th meeting, there appears to be a discrepancy in the counting of ancillary equipment such as coating mixers and sealant and adhesive applicators relating to the Celotex Fremont plant (now owned by CertainTeed). Because all of the sources at the Fremont plant are captured by a thermal oxidizer, the conclusions reached about the best-controlled 6% of sources are particularly sensitive to an understanding of the processes at Fremont. Fremont's process and associated control device are explained in detail in a second document submitted today under separate cover. That document contains information considered Confidential Business Information.

Additional Information from ARMA Survey: Table 1 Summary of Equipment Types and Control Devices

Process Equipment	Total Number In ICR Database	Thermal Oxidizer				PM Control Device				No Control	
		Operating at or Above 1200°F		Operating Below 1200°F		Subject to NSPS		Not Subject to NSPS		Number	Percent
		Number	Percent	Number	Percent	Number	Percent	Number	Percent		
blowstills	91	69	76%	18	20%	0	0%	0	0%	4	4%
Loading Rack	52	16	31%	0	0%	1	2%	10	19%	25	48%
Storage and Process Tanks	774	182	23%	11	1%	115	15%	97	13%	369	48%
Coating Mixers	64 60	4 3	7 5%	0	0%	3	5%	19	31%	35	57%
Sealant and Adhesive Applicators	62 59	5 2	8 3%	1	1%	3	5%	3	5%	50	81%
Coaters	73	4	5%	0	0%	29	40%	23	32%	17	23%
Saturators	15	1	NA ^b	1	NA ^b	10	NA ^b	3	NA ^b	0	NA ^b
Wet Loopers	14	0	NA ^b	0	NA ^b	9	NA ^b	5	NA ^b	0	NA ^b

^b For sources with fewer than 30 pieces of equipment, the MACT floor is based on the control achieved by the median of the 5 best-performing sources

EPA Question #7.

Can ARMA identify which facilities are major sources? Remember a major source is a contiguous facility that has the potential to emit 10/25 tons HAP, regardless of whether it's part of asphalt processing or roofing. E.g., a small blowstill that emits by itself 2 tons/yr would be considered a major source if it's located at a large refinery.

ARMA Response. ARMA did not gather information on blowing stills at refineries. Emissions from roofing lines are low, generally substantially less than ten tons of all HAPs per year (see Table 1 of the MACT Analysis for the Asphalt Roofing Manufacturing Category, submitted February 2, 2001). Roofing lines are generally not co-located with other major sources of HAPs. There are two exceptions: glass mat plants and asphalt blowing stills. These are discussed below.

Glass Mat Plants Co-located with Roofing Lines

There are five plant sites where a glass mat plant is co-located with one or more roofing lines. However, by the time the MACT for the asphalt roofing manufacturing category goes into effect, MACT requirements for glass mat plants will already be in effect. At that time, all glass mat plants will be controlled by thermal oxidizers. The aggregated emissions from the glass mat plants and the uncontrolled roofing lines will not exceed the major source threshold.

Asphalt Blowing Stills Co-located with Roofing Lines

Blowing stills which do not use a ferrous or ferric chloride catalyst are not major sources of HAPs even when co-located with roofing lines. (See Table 1 of the MACT Analysis for the Asphalt Roofing Manufacturing Category, submitted February 2, 2001.) Blowing stills that use Ferric Chloride have the potential to be major sources either as stand-alone plants or when co-located with roofing lines. The table below presents ARMA's current understanding of those blowing stills that have the potential to be major sources:

Asphalt Processing Using Ferrous/Ferric Chloride Co-Located with Roofing Manufacturing

<u>Company</u>	<u>Plant</u>
CertainTeed	Oxford, NC
Atlas Roofing	Quakertown, PA
IKO	Franklin, OH; Wilmington, DE; Chicago, IL, Sumas, WA
Owens Corning	Atlanta, GA; Compton, CA; Houston, TX; Jacksonville, FL; Jessup, MD; Medina, OH; Minneapolis, MN; Portland, OR; Summit, IL

EPA Question #8.

Has ARMA proposed a MACT floor and MACT for storage tanks, loading operations, applicators, and sealant and adhesive tanks? What about coating mixers in fiberglass production lines?

ARMA Response. No separate analysis was done to determine the MACT floor for storage tanks, loading operations, applicators, and sealant and adhesive tanks. In general, ARMA observed that these ancillary operations are not controlled by abatement equipment designed and constructed specifically for the abatement of these ancillary sources. Rather, the ancillary equipment is either uncontrolled or is tied into the control devices for the main source (i.e., the blowing still or the asphalt roofing line).

EPA has significant discretion in the identification of sources. Emissions from these ancillary sources are very low. It is not practical or cost-effective to construct a control device to capture the minimal emissions from sources such as storage tanks, loading operations, applicators, and sealant and adhesive tanks. Accordingly, ARMA recommends that the MACT for these sources be the same as for the main source associated with the ancillary equipment.

EPA Question #9

ARMA seems to have not considered control of particulate HAP in determining roofing line MACT floor. Most, if not all, of the particulate is condensed organics, with much of that HAP. Clearly, the NSPS level of control would be the MACT floor.

ARMA Response. Due to the design of the testing protocol, the condensed organics were measured during the HAP sampling. (EPA will recall that the sampling methodologies used were submitted to EPA for approval prior to their use.)

Method 23 was used to collect the HAPs. The test procedure is run isokinetically to capture both particulate and volatiles. The sample train (See Figure 23.1 from the EPA Method 23 document) consists of a heated probe followed by a PM filter, a condenser and the XAD-2 traps. All contaminants exposed to the sample train components are recovered and extracted and the extract is analyzed. This includes the particulate trapped on the PM filter. The results including HAPs and PAHs were reported. These are the condensible organics (organic PM). Furthermore, the sample train for Method 320 (FTIR) had only an out-of-stack filter heated to approximately 350°F. This allowed a portion of the potentially condensible organics to pass through for analysis.

Therefore, any condensed organic HAPs are included in the emission numbers. ARMA agrees that the particulate matter emitted from asphalt roofing sources includes condensed organics, and that these organics would be well-controlled by NSPS level controls.

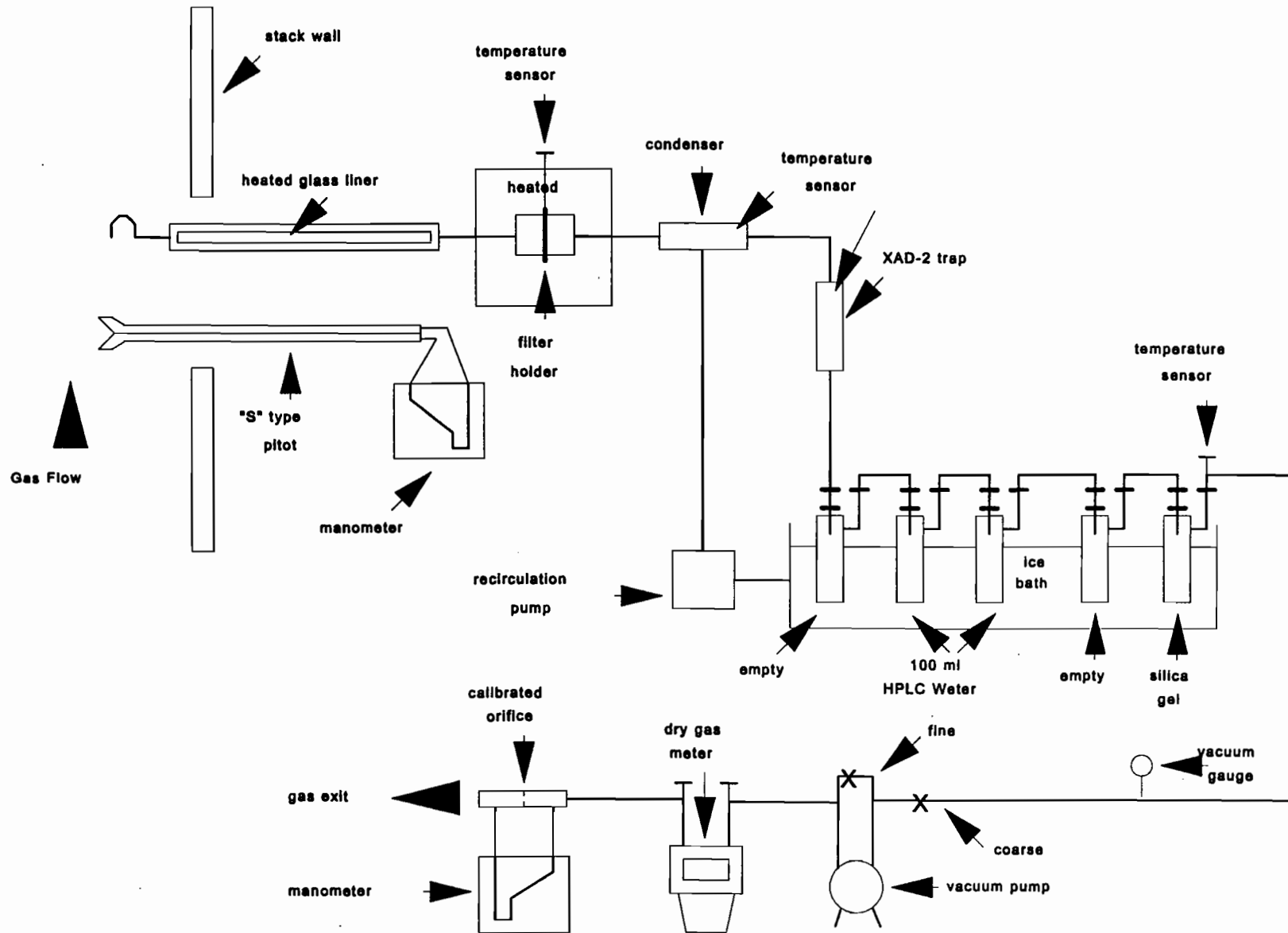


Figure 23.1 Sampling Train

EPA Question Raised During 2/27/01 Meeting.

EPA asked for a "Plain English Version" to explain why the Shakopee data are not included in the ARMA database.

ARMA Response.

In August of 1995, the CertainTeed plant in Shakopee, Minnesota was sampled for HAPs using fourier transform infrared (FTIR) spectrometry. Although FTIR had been used on other sources, this was the first time this method had been used on an asphalt source. Asphalt is a particularly complex chemical matrix. The subsequent analysis of the data revealed the need for further test method development.

The following problems were noted in the analysis of the 1995 data.

1. The FTIR had difficulty in handling the wide range of similar hydrocarbons and the resultant interferences that occurred.
2. Due to difficulties experienced by the sampling contractor, the protocol for sample conditioning was not followed. The sample was delivered to the FTIR through a sample line at 250 F. with only filtration. As a result, there was hydrocarbon carry-over to the cell and coating out in the sample line. In later tests great care was given to maintaining the sample extracted from the stack at or near 350 F. Coating out and carryover were no longer a problem.
3. The compounds in the hexane through isooctane chain lengths were not actually measured due to interferences. In later spreadsheets compiling the data, these were all recorded as hexane.
4. There was strong interference between the formaldehyde peak and the aliphatic hydrocarbons, which make up a major part of the gas phase emissions.

Since the 1995 sampling, there have been significant advances in the FTIR method, the availability of reference standards and sample conditioning. The FTIR method was used with repeatable results on asphalt roofing sources during sampling conducted by ARMA in 1998 and 1999. These results on similar sources (coaters at Minneapolis, Fremont and Frederick) were consistent with each other, but significantly different from the results collected from Shakopee in 1995. Accordingly, the Shakopee data have been removed from the ARMAHAPs.xls spreadsheet containing the sampling database.

EPA Question After the 2/27/01 Meeting.

EPA asked whether hexane should be one of the HAPs listed as being emitted from roofing lines.

In the data spreadsheet initially provided to EPA, it appeared that substantial quantities of hexane were emitted from the roofing lines sampled. As ARMA conducted more detailed analysis of those data, it became apparent that the emissions labeled hexane in the Shakopee data, were, in fact, total hydrocarbons (THC) measured as hexane. (In the Shakopee datasheet these emissions had been erroneously labeled hexane instead of THC as hexane.) Due to the sampling conditioning problems and other concerns associated with the Shakopee data, the quantification of emissions from Shakopee is not reliable. (See response to the question immediately above this one.)

During the subsequent sampling using improved sampling and analytical techniques, hexane was not found in any of the sources sampled.

Accordingly, it is not appropriate to list hexane as a HAP emitted from asphalt roofing manufacturing lines.